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LC-MS-based plasma free amino acid profiling for the early detection and risk assessment of cancers and metabolic syndrome

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Early detection remains the most valuable tool in the fight against chronic diseases. Especially, the need for an early cancer screening method is evident as prognosis depends on how early treatment measures can be taken. Although various analytical platforms exist, currently there are only a few screening tests that have both high sensitivity and the ability for early detection, and also these tests must be taken for each individual cancer. Metabolomics have profound capacity in the search for such candidate markers in that we can obtain comprehensive knowledge and data of metabolisms under specific physiological states. From early observations indicating that amino acids were a convenient subset of the metabolome to investigate changes in metabolism associated with various physiological states, we have developed a technological package (AminoIndex technology) to generate biomarkers for various disease and physiological states using plasma free amino acid concentration data. Risk screening for various cancers with AminoIndex technology have been offered commercially in Japan since 2011. More recently, we have developed novel LC-MS platform that enables high-throughput metabolite profiling including over 40 amino acids, amines and their derivatives. Furthermore, we have constructed a large scale plasma biospecimen bank as well as database containing health and medical information of more than 50,000 Japanese in total concerning multiple diseases (e.g. cancers, metabolic syndrome etc.) and their metabolomic profiles. By variable selection and regression analysis, so far we have developed multivariate indices that enable the early detection of multiple cancers and predictive risk assessment for diabetes and inflammatory bowel disease from a single blood draw. In order to achieve commercialization, various issues ranging from sample handling, throughput to standardization have to be overcome and some of these issues, which may be relevant to other biomarker commercialization, will also be addressed.

Biography

Takeshi Kimura is a Board Member and Corporate Vice President for Ajinomoto Co., Inc. and is currently In-Charge of Research and Development, Intellectual Property, Quality Assurance and Regulatory Affairs. He has studied Cell and Molecular Biology at University of London, Kings College and obtained his PhD in Biochemistry from University of London in 1984. He was a Visiting Fellow and Visiting Associate at the National Institutes of Health in the USA before joining Ajinomoto in 1989. He has worked in research, regulatory affairs and quality assurance since then, helping to establish the basis of AminoIndex Technology while in research. He became Corporate Executive Officer in 2009 and Board Member in 2013. He is also a Member of the Board of Trustees for International Life Sciences Institute and Research Foundation, International Advisory Council Member for Monell Chemical Senses Center and Japanese Private Sector Member for APEC Policy Partnership for Food Security.

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